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TENSILE BEHAVIOR OF FRICTION-STIR WELDED Al-Mg-Si ALLOY

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In this work, digital-image-correlation technique was applied to examine an evolution of strain distribution during transverse tensile tests of friction-stir welded (FSW) Al-Mg-Si alloy. Due to sharp thermal- as well as strain gradients inherent to FSW process, the microstructure distribution within the welds is usually heterogeneous and thus the mechanical response is expected to be not uniform. Indeed, the tensile strain was found to preferentially concentrate in heat-affected zone, presumably due coarsening of strengthening precipitates in this microstructural region and the concomitant material softening. With subsequent tensile deformation, however, the strain also expanded to a relatively hard stir zone and this observation was attributed to a work hardening effect. Nevertheless, the tensile strain was shown to have highly localized character and this resulted in premature failure of the welds.

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